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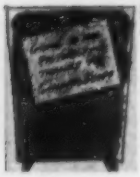

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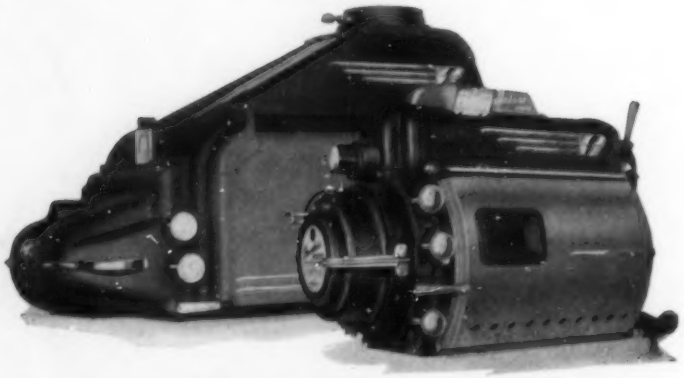

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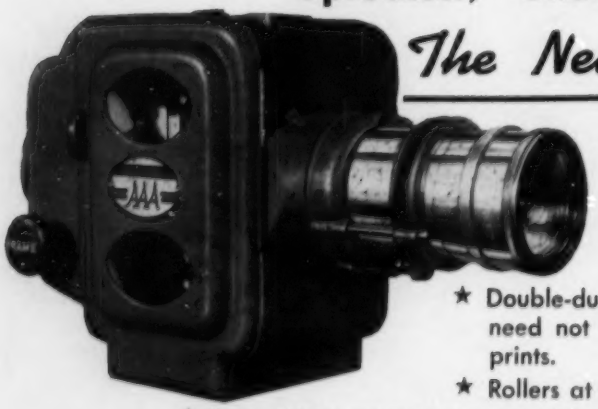

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INTERNATIONAL PROJECTIONIST

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Monthly Chat

Technicians Win Recognition

THE critical point in the development of modern motion picture presentation was reached when the various "new" processes engulfed the exhibition field. Technology, not subject to the whims of "gadgets," is Gospel today.

A swing around the theatre field in various sections of the country has convinced the writer that the most pressing projection problems at the moment is the ease with which the film stock is being chewed up heat-wise, by modern high-intensity light sources.

Scores of suggestions for alleviating this problem—some of them reflecting a great deal of serious thought, some of them borderline crackpot—have been advanced, but all these notions tend to neglect the fundamental requisite of cooling *not* the mechanism but the film itself!

"Well," say these eager-beaver projection practitioners, "this is a problem in chemistry for the manufacturers of film stock. We're just trying to correct an inherent error in the medium supplied to us."

"Well," responds IP, "why not meet the problem head-on by recognizing the basic difficulty instead of trying to peddle all sorts of expensive gadgets which serve to weigh down not simplify the projection process?"

There has always been a definite lack of (shall we say?) cohesion between the productive and the exhibition forces of the motion picture industry. Cost factors, utterly ignored on the production and exhibition fronts (you pick up the effort check, Mike) is the problem of translating the sum total of all the high-priced talent recruited by the "executive" brains of the industry into box-office dollars—which means their salaries as well as ours.

We who *show* the pictures to the *paying public* should be consulted on the basic problem of the motion picture industry—exhibition.

We who strain to *translate* the productive and distributive efforts of the industry should not only be advised in detail in advance of any technolgical change but should be consulted as to the best means for changing glamour pusses into box-office dollars.

This corner cannot remember a single occasion within the past 25 years when the projection craft was consulted on a contemplated change in technological standards. Many more years ago than we care to remember there arrived breathlessly in New York a representative of the studios who announced blandly that a new aspect ratio had been decided upon—with a major producer already in work on three feature releases. As an afterthought, this fellow decided to consult projection people, only to find out to his profound dismay that he was wrong! Why? Because in his pet studio projection rooms where they shot all stuff *on the level* they ignored completely the fact that the *average* projection angle in theatres was of the order of 15 degrees! This fellow nearly swooned when measurements showed that the angle in the N. Y. City Paramount Theatre was 26½ degrees. Result: all the studio-calculated characters would have their heads and feet cut off.

Technological problems being the prime interest in the motion picture industry today, there is no reason why a meeting of minds among various branches of this industry could not resolve all these matters on a mutually satisfactory basis—and this suggestion is advanced with the most constructive will in the world.

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VOLUME XXX JANUARY 1955 NUMBER 1

The story of light for theatrical film projection is mostly the story of the carbon arc—most powerful of all illuminents.

Light Sources for Film Projection

By ROBERT A. MITCHELL

ELECTRICITY was not essential to the projection process in the days when the movies were silent and projectors were cranked by hand. "Picture halls" in rural districts often employed the *limelight* for illuminating the antics of the Keystone Kops. The "limelight," also called the calcium light, consisted of a small cylinder, or "pin," of quicklime (calcium oxide) heated to incandescence by the flame of the oxy-hydrogen blowpipe.

Hydrogen gas burns in air (about 1/5 oxygen by volume) with a hot, non-luminous flame. If it be made to burn in *pure* oxygen gas instead of air the flame is much hotter. By allowing the point of the flame to impinge upon the "lime-pin," a brilliant white light is produced.

Carbon Arc's Preeminence

The brightness of the limelight is inferior to that of the carbon arc; and because hydrogen is dangerously explosive when mixed with air or oxygen, the theatre laws of many cities prohibited the use of this illuminant.

The carbon arc was used in the earliest days of motion pictures. With continued improvement over the years, it has attained its present position of preeminence among the suitable light sources. The incandescent lamp was formerly used in small theatres as it is used even today for home movies; while the Xenon discharge bulb, a comparatively recent development, shows definite signs of supplanting low-amperage carbon arcs in small and medium-size theatres. But whatever new illuminants come along, the carbon arc will probably always be the undisputed king of light sources for projection on the larger screens.

The history of the carbon arc began late in 1809 when Sir Humphrey Davy connected two rods of charcoal (a form of carbon) to the terminals of a powerful voltaic battery, touched the ends of the rods together, and then separated them. A luminous bow, or arch, of electricty-conducting carbon vapor was instantly created, and this "arc" of hot gas heated the ends of the carbon rods to white-hot brilliance.

It was soon discovered that rods of coke—a hard, graphitic form of carbon—made possible brighter "arclights" than did charcoal. Modern carbons are made by mixing lampblack and pulverized petroleum coke with tar and pitch as bonding agents, moulding the "dough" into rods, and baking the soft rods until the bonding agents carbonize. But the commercial use of arclights had to wait until the dynamo was invented and perfected.

Chemistry of Carbon Mixture

About 1850 carbon arcs provided the illumination in French lighthouses; and by the end of the century the use of arcs for street illumination was commonplace.

Improvements in the carbon rods, or electrodes, greatly increased the efficiency of the arclight. Carbons were first made in moulds. Moulded carbons were seldom perfectly round, and their structure was often loose and granular. Arclamps in which moulded carbons were used sputtered and flickered violently.

The first major improvement in carbons was the extrusion or *forcing*, the doughy mixture through accurately-made dies. These "forced" carbons were purer and more uniform in texture and shape than moulded carbons, burning more smoothly and being less expensive. Understandably, they won the favor of their users. All modern carbons for searchlights and

motion-picture projectors are "forced" carbons.

It is not difficult to understand how an arclight works. When the switch is thrown to supply an electric current to the two carbon electrodes, nothing happens at first because the ends of the two carbons are separated by an air-gap, and the voltage is much too low to "jump" a spark between them and to start the arc burning. The projectionist, therefore, must touch the ends of the carbons together in order to establish an electric current.

Now, the point of contact offers so much resistance to the flow of the strong current that the ends of the carbons get hot and begin to vaporize—and carbon vapor is a conductor of electricity.

The projectionist then separates the two carbons until their ends are the proper distance apart—a quarter of an inch, more or less. Current continues to flow because the hot carbon gas conducts it, this gas assuming the characteristic form of a luminous arch called the *arc stream*. But even though the arc stream glows, most of the light comes from the tips of the carbons which are then heated to an incandescence which rivals the brilliance of the sun.

Carbon Thermal Capacity

Carbon is a peculiar substance. It is a chemical element—and even though it be not a metal, it nevertheless conducts current fairly well. Moreover, it remains a solid even up to a "white heat" of 6,638 degrees F. (3,670 degrees C.) a temperature far above the melting points of all known metals. And when carbon *does* attain this tremendously high temperature, it does not melt to a messy liquid but evaporates, or "sublimes," directly to a gaseous state.

If carbon did not possess these unusual properties, we could have no carbon arcs, without which the gigantic wide screens of modern movies would be impossible.

If an arc be examined through dark glasses to shield the eyes from its intense radiance, it will be seen that the brightest part is the tip of the carbon connected to the positive terminal of the source of direct current. The arc stream, as we said, is comparatively dull. The tip of the *negative* carbon is bright, but not nearly so bright as the end of the *positive* carbon. In the case of the low-intensity D.C. arc, about 90% of the light comes from the end of the positive carbon, 8% from the tip of the negative, and 2% from the arc stream.

Anatomy of the Positive Crater

Close inspection of the arc (Fig. 1) reveals that the white-hot tip of the positive electrode (anode) is a saucer-like *crater;* while that of the negative electrode (cathode) is a pencil-shaped point. It will also be seen that the arc stream connecting the two carbon ends consists of a dark violet-blue central core surrounded by a white flame.

In the blue core the volatilized carbon combines with the oxygen of the air to form carbon monoxide; while in the white flame both the carbon monoxide and carbon vapor burn to carbon dioxide. Rising up and flaming away from the arc stream is the yellow *tail-flame* of the arc.

In most motion picture projection systems, picture illumination is furnished *only* by the intensely radiant positive crater—the light from the negative tip, arc stream—and the tail-flame not being utilized.

But why is the crater of the positive carbon so much brighter, in D. C. arcs, than the tip of the negative carbon? To answer this question we shall have to tell what happens in the electric arc.

Electric current is a flow of electrons, those tiny particles of negative energy which whirl in dizzy orbits around the positively-charged central cores of atoms. The electrons move from the negative terminal of the current-source to the positive terminal. This direction of motion causes the electrons to pass from the tip of the negative carbon to the crater of the positive carbon.

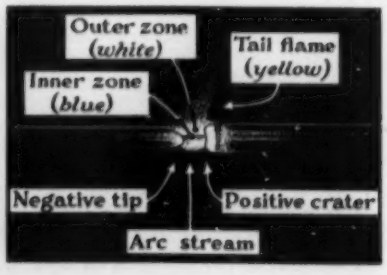

FIG. 1. The low-intensity arc as seen through a dark glass. About 90% of the total light is supplied by the white-hot solid carbon of the positive crater. The carbon boils away as a gas, but it immediately loses its brightness as it does so. The carbon vapor forms the current-conducting arc stream and finally dissipates itself as a tail-flame.

Very little energy is removed from the electrons as they pass from the tip of the negative carbon and enter the arc-stream, because the arc-stream, although tenuous, is very hot (about 10,823 degrees F. or 6,000 degrees C.) and is a good conductor of electricity. In other words, the voltage-drop between the tip of the negative and the arc-stream is slight, and, consequently, the heating of the negative tip is comparatively small.

But when the electrons arrive at the positive carbon they encounter an obstacle to their carefree flight. The positive carbon, although quite hot by ordinary standards, is several thousand degrees cooler than the arc-stream. The coolness of the carbon overlays the crater floor with a thin film of relatively cool carbon gas. This film is called the *anode layer.*

The hotter a gas the better it conducts electricity; so, as we might expect, the anode layer offers great resistance to the electrons passing over from the *negative* carbon. They are slowed down at once by the anode layer, and they get all hot and bothered about it, transferring much of their kinetic energy to the crater floor as *heat energy.*

Temperature of the Crater Floor

So much energy is transferred from the electrons to the positive crater that the temperature of the crater floor goes up to the boiling point of carbon (6,633 degrees F. or 3,670 degrees C.). Yes, the carbon in the crater floor actually boils away as gas; and the layer of boiling carbon, from which comes 90% of the light of a low-intensity arc, is extremely thin.

But why isn't the arc-stream brighter than the positive crater? It's hotter, isn't it? The arc-stream has a higher temperature, to be sure, but the crater has more *heat energy measured as calories.* The positive carbon is solid—dense, with millions of multi-billions of atoms tightly packed together. The arc-stream is gaseous—tenuous, thin, ethereal, with atomic world-systems separated by wide-open spaces of *terrifying nothingness!*

Gases (unless loaded with dust particles) must be heated to millions of degrees before they get very bright. Not so with liquids and solids. It is the hot solid carbon of the positive

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The arc is stabilized by a stream of air which maintains a prescribed system of ventilation of the area surrounding the arc. This air jet prevents the hot tail flame of the arc from reaching the reflector, supplies enough oxygen so that no black soot is produced, and keeps white soot from collecting on the reflector in such quantity as to absorb heat which would cause breakage.

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crater that furnishes most of the light. The moment the carbon boils away, it becomes part of the arc-stream—hotter, but *less luminous.*

Put into electrical terms, the story is more easily told. Just as there is a small voltage-drop between the tip of the negative carbon and the arc-stream, and another small voltage-drop from one end of the arc-stream to the other, there is a *comparatively great* voltage-drop between the arc-stream and the positive crater. This great drop is due to the anode layer of cool carbon gas of high electrical resistance lying over the crater floor. When current (amperage) is forced through a resistance by electromotive pressure (voltage), that resistance gets hot.

As a specific illustration, consider a low-intensity arc operating on 60 volts. This is a way of saying that there exists a 60-volt voltage-drop between the two carbons as measured by a voltmeter. Now, the total 60-volt drop is divided as follows: 5 volts between negative tip and the beginning of the arc-stream; 15 volts between both ends of the arc stream, and 40 volts between the end of the arc-stream and the positive crater.

Physical Character of Arc-Stream

It might seem as if the arc-stream, the hottest region of an electric arc, should have the greatest voltage-drop. As stated previously, the total *amount* of heat (calories, *not* degrees) is greatest in the positive crater. Then, too, the arc-stream actually gets much of its heat from the anode-layer drop. Energy is absorbed when the carbon changes from a *solid* to a *gas,* and the gas burns in the arc-stream, releasing its absorbed energy. This is a complex and interesting process.

No less interesting are the electrical properties of the arc-stream. Most solids that conduct electricity, such as wire, offer more resistance to the passage of current as they get hotter. But the arc-stream, like all other gaseous conductors, offers *less* resistance as its temperature goes *up.* The arc-stream makes a fool of Ohm's law.

Ohm's law is a rule involving three factors: current in amperes, electromotive force in volts, and resistance in ohms. When we know *any two* of these three factors in a circuit, we can find the third by using a simple formula which exists in three forms:

Amperes = Volts divided by Ohms.
Volts = Amperes multiplied by Ohms.
Ohms = Volts divided by Amperes.

Ohm's Law Not Applicable

The Ohmic formula, so handy in ordinary electrical problems, does *not* work with gaseous discharges such as the arc-stream. An arc-stream can get denser, fatter, and hotter, and hence more conductive—things that no solid conductor can do. So, we see, the arc-stream does not *limit* the amount of current flowing in a circuit as ordinary resistances do.

Feed more current to an arc, and the resistance decreases. With lower resistance, more current flows. And this decreases the resistance still more, allowing still more current to flow. The arc runs wild, the resistance decreasing and the current increasing, until the generator burns up or a fuse blows.

This is why a current-limiting device such as a ballast rheostat *must* be used to keep an arc under control. Without something of this sort to restrain it, the most mild-mannered arc becomes a raging, flaming short-circuit. Most rectifiers have choke coils or transformers on the A.C. side which function like the ballast rheostats used with motor generators.

A ballast rheostat necessarily consumes current and delivers a voltage at the arc somewhat lower than the voltage at the generator terminals. A low-intensity arc operated on 60 volts ordinarily requires a 20-volt drop in the ballast rheostat for smooth, stable operation. The generator, accordingly, must deliver 80 volts. (The ballast is connected *in series* with the arc.)

Universal acceptance of the IP thesis, expressed in a recent editorial, that the new processes require a hydro-handed projectionist is indicated by this illustration, intended to be humorous but in reality in a most serious vein, culled from the current issue of "Ideal Kinema," British technical journal.

If the generator be located in the cellar of the theatre or at some other point at quite a distance from the projection room, "line drop"—the resistance of the wires from the cellar to the projection room—may be substantial. Line-drop should be regarded as part of the ballast drop; so if the line drop be 2 volts, the ballast drop need be only 18 volts in the case of the 60-volt low-intensity arc. But in any case, the generator must furnish a potential of 80 volts for the 60-volt L.I. arc.

The earliest carbons were "solid," that is to say, they were *hard carbon all the way through.* When solid positive carbons are used, the arc "wanders" irregularly around the end of the carbon, continually searching for the path of least resistance which it never seems to find—quite like Diogenes looking for an honest man. The light accordingly, flickers, making the arc unsuitable for motion picture projection.

In order to stabilize the arc, "cored" carbons came into use. A hole is formed longitudinally through the axis of the carbon during manufacture, and this hole is subsequently filled with softer powered carbon mixed with potassium salts which steady the arc.

Reason for the Cored Positive

Cored positives are always used in motion-picture projection. The core mixture turns to vapor more readily than the hard carbon shell, thus establishing a good arc at a lower voltage than that required for a solid carbon. The vaporized potassium salts increase the electrical conductivity of the arc-stream, insuring that the electrons rushing across the gap from the tip of the negative will land plumb in the center of the positive and form a symmetrical crater of proper depth *right there.*

The positive carbon of an arclamp "trim" is consumed about twice as fast as the negative when both carbons have the same composition and the same diameter. By using a positive larger in diameter than the negative, the rates of consumption can be made nearly equal. This expedient also minimizes the shading of the luminous positive crater by the tip of the negative, thus increasing the amount of

(Continued on page 30)

1954: Decisive Year for Film Industry

By JAMES MORRIS

During 1954 many needless fears were quieted, and the industry began to look ahead to future triumphs rather than backward on past glory. Also, much was accomplished in standardizing the new techniques for film projection.

IF ONE were to select a single word that would sum up the attitude of most of the people in the motion picture exhibition field in the first month of 1955, that word would be *confidence*. Last year, at the beginning of 1954, the outlook was much different. The air was filled with the frenzied cries of those who predicted that thousands of theatres would succumb to the competition of the home Tv set. In addition, the new projection processes were often misused by both producers and exhibitors in a desperate effort to hold on to what was felt to be a steadily diminishing movie audience.

There are two outstanding reasons for the renewal of confidence in the future of the motion picture theatre.

Drive-Ins Took Up Slack

First, it has been established that the figures on wholesale closings of theatres are misleading. Thousands of theatres have been forced to close since the war—yes. But thousands more have opened. The booming drive-in business has taken up the slack. The number of "seats" in both automobiles at drive-ins and indoor theatres is now greater than in 1946, an all-time peak year for the industry.

If this gain could occur during a period of confusion and despair, it follows logically that much more can be accomplished by a sound and consistent plan to maintain public interest. The business is not on its last legs—far from it.

The second reason for renewed confidence is that during 1954 much progress was made toward standardizing the new projection processes. In the beginning, some of the claims were so confusing and frantic that the impression was given that many of the promoters did not really believe their own statements. Now most of the chaff has been separated from the wheat.

One of the new ideas—the use of a large, wide screen—has definitely proven its worth as a means of giving films a new look and attracting customers to theatres. Another, 3-D, proved to be little more than a temporary "gimmick" in its present state of technical development, and has been discarded for the moment at least.

Credit for better business during 1954 is attributed to improved projection techniques and to better pictures—pictures that attracted audiences by better story value, photography and direction.

The Small Exhibitor

All-around improvement in both presentation and production brought new customers into the theatre, but in the complicated exhibition industry it also created problems. Exhibitors, who previously complained that they were being overloaded with junk, became bitter over the fact that Hollywood was trying to concentrate on fewer but "bigger" pictures instead of a large total output.

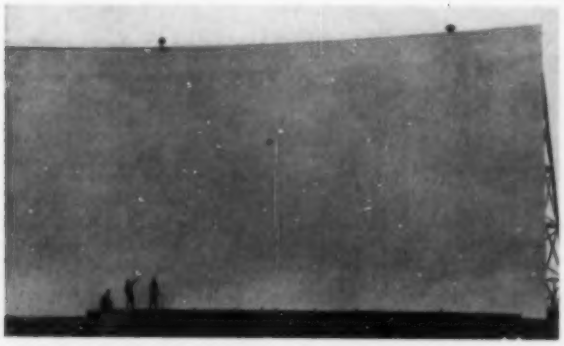
The smaller exhibitors, particularly those running neighborhood houses, were quick to discover that their existence was jeopardized by a production system that did not provide them with enough product for frequent program changes. They found that their theatres were supported, to a large extent, by habitual moviegoers who attended often provided a new picture was playing.

If the exhibition industry is closely examined at this moment, it will be found that the small neighborhood theatre is in the weakest position. The owner has great difficulty getting the product he needs, and he is hard hit by competition not only from the home Tv set but from within the industry itself. The new drive-in audience, for instance, must come from somewhere, and it is safe to say that a portion is made up of people who formerly patronized a neighborhood theatre. While the first-run houses and drive-ins are making money and solving most of their problems, many small exhibitors find themselves with their backs to the wall.

This situation is behind the agitation of exhibitor groups during the past year to form a pool for the financing of more pictures from Hollywood. It is also behind the current efforts to promote foreign films. The small exhibitor feels, and probably rightly, that he cannot survive on a diet of a few high-quality pictures.

Technical Developments

Of great interest to projectionists are the technical developments of 1954. After the heated enthusiasm and confusion of 1953, much was accomplished in further developing the new



The giant screen erected last year at the Motor Vu drive-in, Salt Lake City, is an example of the radical changes now going on in film presentation. This screen, 102 feet wide and 48 feet high, is designed for CinemaScope. Filling it with an acceptable picture is a formidable task.

projection techniques and a good start was made in arriving at standards which would make possible the showing of all pictures in all theatres and also protect the investments made by purchasers of projection and sound equipment.

3-D, as mentioned earlier in this article, fell flat on its face at the boxoffice early in 1954. Despite tremendous publicity efforts, this form of presentation could not survive in the face of difficult projection problems and the attitude of producers who used it in an unsuccessful attempt to make platable some of the dullest and most tasteless pictures that Hollywood ever turned out.

On the brighter side, it may now be stated without fear of contradiction that the big, wide screen is here to stay. There are still many arguments, however, as to whether it should be flat or curved, white or metallic-surfaced, and whether the aspect ratio should be 1.75, 2 or 2.5 to 1. Also, both anamorphic and standard wide-angle lenses are being used to obtain the wide pictures.

Stereosound Widely Accepted

Becoming more and more widely accepted but not yet as entrenched as the big screen are stereophonic sound systems. Not so obvious a drawing card as the big screen, stereosound has been resisted as too expensive by many small exhibitors trying to cope with losses at the boxoffice.

However, as 1954 progressed most of these complaints were quieted. Doubting exhibitors came to the realization that theatres could no longer prosper unless they offered the very best in both screen image and sound. Expenditures for new amplifiers, speakers and magnetic pick-ups came to be regarded as investments in the future even if the initial payments hurt.

The variable anamorphic lens, a surprisingly simple device for unsqueezing anamorphic prints, was put into production last year by a number of different firms. These lenses accomplish their purpose by means of two adjustable prismatic wedges. The lens shown above is the Hilux, made by Projection Optics.

Also, another stereosound system, Perspecta, was developed by Fine Sound, Inc., of New York City. This system works by means of one cued optical track that can be reproduced over either a triple-channel stereosound system or the older single-channel amplifying and speaker system. To further ease the sound reproduction problems of small exhibitors, 20th Century-Fox announced early in the year that it would provide single-track optical sound prints of CinemaScope pictures to theatres desiring them.

Advent of VistaVision

One of the most noteworthy technical events of the year was the advent of the VistaVision process under the sponsorship of Paramount Pictures. Basically a camera process that provides a superior projection print without requiring any change in the projector itself, the VistaVision print is capable of providing a screen image of great detail and little graininess even under the largest magnification.

As all IP readers now know, VistaVision is simply a means of photographing a picture with a camera having a horizontal film path and exposing a frame more than twice the standard size. This larger negative is reduced to standard size by an optical printing process that retains practically all of the increased detail gained from the larger negative.

For unusual projection conditions in large theatres where screens of fifty-feet width and over are used there is also a special VistaVision projector with a horizontal film path that projects a double-size frame, providing more light and still greater image definition. This projector is being manufactured by the Century Projector Corp. and was described in the October issue of IP.

Trend Toward "Roadshow"

Another interesting development of 1954 were the plans for limited and "roadshow" exhibition of certain pictures with projection equipment that would produce approximately the same results as the horizontal VistaVision projector. These plans were at least partly inspired by the continuing success of Cinerama which has a somewhat similar exhibition policy.

The fastest American projection lens is the Kollmorgen f/1.7, which made its debut late last year. Designed to help solve the often critical light problems of wide screen projection, it considerably increases the amount of available light transmitted to the screen.

The Todd AO production of "Oklahoma," which was filmed with special large-negative, wide-angle cameras, will be presented on a limited basis in a few theatres where projectors for 65-mm film and special stage and screen masking equipment will be installed. Todd AO is an example of the roadshow trend. In addition, 20th Century-Fox is working on the idea of making 65- or 70-mm prints of CinemaScope productions for special first-run showings. The Cinerama people also have additional plans. They plan to widen the distribution of their show by building a portable three-projector unit that will fit in one projection room and make it possible to present Cinerama in a great many theatres with only minor temporary alterations.

An important technical development was the recent announcement by the International Projector Corp. that it can now supply a modified version of its latest Simplex projector that incorporates a water-cooled aperture and an air blast cooling system for the film. Use of high-powered arclamps for filling big screens makes this additional cooling equipment necessary, it was said. Another projector manufacturer, Motiograph, reports that production will begin shortly on a new projector designed to increase the efficiency of wide-screen projection.

During 1954, lens manufacturers produced new high-speed, wide-angle units designed to transmit the largest

(Continued on page 29)

Notes on Exhibition In Foreign Lands

By DR. JOHN G. FRAYNE
Westrex Corporation

DURING a recent round-the-world trip, the writer had the rare opportunity of visiting a great number of theatres scattered throughout the major cities of the world representing diverse races, languages and cultures, and under a wide range of climatic conditions. One common denominator was the universal interest in America motion pictures.

New theatres were being built all over the Orient, many of the ornate type reminiscent of those erected in America during the plush 20's. The local architects are, however, incorporating the latest ideas in acoustic treatment of walls and ceilings. The most modern indirect auditorium lighting is usually installed and provision is made for larger proscenium arches to accommodate the widest possible screens. Comfortable seating facilities are prevalent.

Much Interest in CinemaScope

The CinemaScope era had just dawned about the time this trip was first planned, and initial runs of pictures like "The Robe," "Command" and "Khyber Rifles" had taken place before my visit in many countries. The reaction abroad was very favorable; and theatre managers with whom I talked attributed the success of these pictures, in part, to such technical features as the wider screen, excellent color, and stereophonic sound.

At the present time there are additional CinemaScope completions in Japan, in which country there were ten very early CinemaScope installations. In Hong Kong, Manila, Singapore and Djakarta (Indonesia) a number of theatres were similarly equipped. India had about 20 installations. In European countries, such as Italy and France, the reception of CinemaScope pictures was very favorable.

Some foreign theatres are gigantic in size and provided with the finest projection and sound equipment. Above is the Gaumont Palace Theatre in Paris, which stands in the first rank among the world's film theatres.

Foreign Technicians Well Trained

One item that might surprise an American engineer on a tour of this nature is the wide dissemination of technical information about current and proposed film projection techniques and the high educational level of responsible officials in theatre supply companies, service organizations and theatre chains. Highly efficient theatre service organizations, staffed by competent local engineers equipped with modern test equipment, are found everywhere.

Conversation with these people is much the same as with their counterparts in America. Covered are such subjects as the relative merits of anamorphic *vs.* widescreen, stereophonic *vs.* monaural sound, auditorium speakers *vs.* none, and the relative merits of American *vs.* Continental projectors. In short, the technical groups in every country visited are wide-awake and completely up-to-date in their knowledge of the latest equipment and techniques.

In the design of theatres, it is my opinion that foreign technicians are somewhat ahead of their American colleagues. For instance, one theatre in Manila employs an acoustic design found only there *and* at the United Nations Assembly Hall in New York. In Dublin (Eire) we find the first theatre in the world built specifically for CinemaScope screen and sound, as far as sight lines are concerned. Another interesting feature of most foreign houses is the incorporation of snack bars and tea rooms in the theatre building, which seem to attract customers and make the theatre a social as well as amusement center.

Reproducing Sound Methods Overseas

Many different methods are used to present the dialogue and sound of American pictures throughout the world. In the Orient and in India, printed titles are generally used; while in Europe local dubbed versions are generally employed. English language versions are confined almost entirely to Great Britain and British Commonwealth countries, a few English-speaking countries such as Eire, and a few metropolitan centers. In Singapore the writer saw a projectionist following the dialogue with homemade lantern slides, a practice I am told is quite common in the more backward areas.

On the whole, there is no depression in foreign motion picture theatre business. Houses seemed to be filled almost everywhere, a factor which inspires exhibitors to invest in really striking and elaborate theatres. A good example is the Avenue Theatre in Manila, which is combined with an hotel eight stories high. The theatre's spacious lobby occupies one-half of the ground floor of the hotel building. The wall of the foyer facing the staircases is covered with a big mural. The theatre auditorium is built behind the hotel and seats 1560 people with ample standing space in both the balcony and the orchestra for at least 500 more.

Projection room equipment includes a Westrex Master photographic sound system with dual-channel 100-watt amplifiers and a 3-projector installation. A stereophonic

Film Damage on the Increase

By HENRY B. SELLWOOD

FILM damage is on the increase. Complaints from projectionists concentrate on the prevalence of "rain," a defect consisting of innumerable lengthwise scratches on the film. The exchanges gripe about projectionist "mishandling" of prints; projectionists blame the exchanges. It seems to us that the exchanges have failed to track down the ultimate causes of film damage.

The present-day shortage of prints is in large part phony. There is no shortage of positive raw stock. Very often fresh prints of current pictures repose unused in the vaults while badly mutilated prints of the *same pictures* are sent out again and again. The best repair work on some of these prints is done, not by the exchanges but by projectionists.

Written Complaints of No Avail

Any competent projectionist knows when a print is in unrunable condition; and instead of doing the exchange's work for free, he should throw such a print back where it came from. This is ordinarily the only way to remedy an intolerable situation: written complaints enclosed in the film cases apparently aren't even read.

There are plenty of inexperienced and incompetent "operators," many of whom are *under-aged* and underequipped with brains, who treat the prints very roughly—prints that come to you and me sooner or later. If the kids work cheaply enough, the backwoods exhibitors don't give a damn. Not even when a film exchange presents them with a whopper of a bill for wrecked footage. They blame the damage on someone else.

It is unfortunate that the fellows who pepper the last 25 feet of each reel with those screen-filling X's, O's, and other homemade cue-marks are often the first ones to get a crack at the brand-new prints. Most of us don't like to break in a "green" print: the freshly waxed film may "stick," running nosily and depositing wax and emulsion all over the gates.

So what do the exchanges do? They book pre-release and first runs in the Rosebud Theatre over the feed store in Belching Corners to get the "green" prints broken in. But the vintage Powers projectors and junk soundheads in the Rosebud chew the film up as well as break it in.

Obsolete Equipment Still With Us

Another unfortunate thing is the obsolete and wornout equipment that many conscientious and skilled projectionists have to operate. All too many exhibitors are willing to appropriate thousands for the lobby, but not one penny for the projection room. Good projectionists, however, by keeping the projectors properly adjusted and clean, and by insisting on frequent sprocket replacements, can minimize the damage which antique equipment inflicts on film.

But in certain cases brand new projection and sound equipment devastate untold miles of film. We refer specifically to CinemaScope 4-track stereophonic sound reproducers. The damage which these magnetic soundheads inflict on CinemaScope film is one thing: the scratching of regular optical-track prints by these heads is another.

Magnetic-track CinemaScope prints must run in a tight loop over the various rollers of the penthouse soundhead and rub against the magnetic pickup. This is punishment for any film; and the use of narrow sprocket teeth also helps to shorten the life of 4-track CinemaScope prints.

Film Path Contingencies

When regular optical-track prints are shown, the film is threaded directly from the upper-magazine fire rollers to the upper feed sprocket of the projector mechanism, by-passing the numerous weighted rollers of the magnetic compartment. To prevent the film from scraping against the edges of the holes in the top and bottom of the penthouse reproducer, however, it is threaded over and under one or two of the reproducer guide rollers.

Serious trouble arises when the roller arrangement of the magnetic reproducer is not adapted to either the type of magazine fire valve or the make and model of projector mechanism used. In such a case film that is threaded to by-pass the magnetic reproducing gear may actually rub against the edges of the openings in the bottom of the magazine fire-valve, the top of the magnetic soundhead, the bottom of the magnetic soundhead or the top of the projector mechanism.

An Important Simplex Part

A case in point is provided by the Simplex X-L magnetic soundhead when used with the regular-type Simplex magazine fire valve box and the

(Continued on page 28)

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sound system was recently added using 3 Westrex R9 Reproducers, 3-stage speaker systems and 14 auditorium speakers.

Technical innovations in motion pictures duriing the past two years have made a very deep impression on technicians and exhibitors throughout the world. Directions for presenting pictures filmed in the new processes are usually followed exactly. Where CinemaScope is installed, for instance, the recommended 2.55 to 1 screen ration is generally maintained in spite of screen widths as small as 32 feet.

The Gaumont Palace in Paris is an ideal example of the lengths which many European exhibitors have gone in adapting themselves to the new processes. With a seating capacity of 5500, this is one of the largest theatres in the world. In addition to a 73-foot by 44-foot Raytone screen and a Westrex stereophonic sound system, the Gaumont is now equipped with super-power lamps using blowers and heat deflectors. Four 125-ampere motor generator sets are used.

The Queens Theatre, perhaps the most popular theatre in Hong Kong was recently converted to accommodate a 42-foot CinemaScope picture. Here, the Astrolite screen was mounted flat, but still gave a good light distribution throughout the whole seating area of the theatre. Other equipment now includes Century water-cooled projectors and super-power arc lamps.

From Toy to a Great Industry

III. THE LIVING PICTURE. The concluding article of three in which are detailed the development of the motion picture from its inception down to the present. Originally appearing in "Movie Makers" magazine, these articles attracted widespread industry interest and acclaim as a vital contribution to the literature.

By JACK E. GIECK

MANY "inventors" were in the act by this time, and it is difficult to assign credit accurately. But an important pioneer of the era was a U.S. Treasury stenographer, C. Francis Jenkins.

One of Jenkin's early "Phantoscope" cameras is shown schematically in Fig. 11. The film moved continuously in this camera. Lenses mounted on the large opaque wheel moved by the aperture tangentially, each one traveling with the film for a short distance as it passed by.

A home viewer marketed by Jenkins between 1894 and 1896 is shown in Fig. 12. Also called a Phantoscope, this viewer contained several hundred individual frames printed on small cards, which were mechanically flipped when the crank was turned. The sequence in this machine includes a performance by a troupe of circus elephants.

1895—Lumiere's Cinematographe

The first commercially successful projector appeared in France in 1895. It was Louis Lumiere's "Cinematographe," the first machine to employ a practical *intermittent* movement. Lumiere's projector, and the camera he also built, both had cam-operated, pull-down claws similar to those used in most amateur cameras and projectors today.

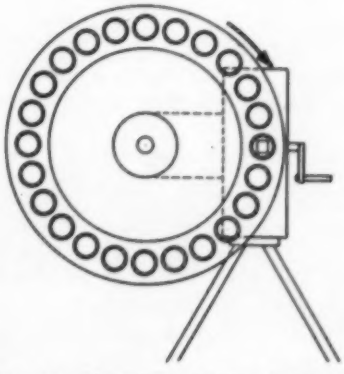

FIG. 11. Phantoscope camera, designed by C. Francis Jenkins, moved lenses and film.

The condenser lens in the projector absorbed arc heat in the same manner that the original Jenkins machine had. Both employed round-bottom chemist's flasks filled with water to converge the light on the film. When the water began to boil, the optical properties of this lens left something to be desired.

The Edison Kinetoscope projector, patented in this country in 1897, is shown in Fig. 13. This machine featured intermittent beater-movement sprockets to transport the film past the aperture. The electric arc lamphouse is obviously a converted magic lantern.

Figure 14 is the "Biographet" projector brought out by Edison in 1898 and manufactured by the American Mutoscope Corp. In an attempt to improve on the jerky beater sprockets, this projector employed continuous film movement, utilizing a rotating glass prism in conjunction with a tracking spiral shutter to scan the film as it went by. This principle (minus the shutter) is now employed in the Western Electric Fastax camera which takes high-speed movies up to 14,000 frames per second. Fig. 15 is an experimental Edison projector employing one of the first Geneva movements, which movement ultimately became the industry standard.

First Home Movie Projector

In 1897, Edison also brought out the first home movie projector (Fig. 16). This unique machine used a picture film sold by the manufacturer (there were no home movie cameras) which was approximately 32-mm wide and bore *three* parallel tracks of images. The frame size was about the same as present-day 8-mm film (3.51-mm x 4.80-mm) and the projector aperture was adjustable.

FIG. 12. Jenkins's Phantoscope viewer moved hundreds of small cards as in a flip-book.

When the picture was started, only the left 1/3 of the aperture slot was open. The film was cranked through the machine until the upper reel was nearly empty, then the aperture was racked over to the middle position, the projector re-aimed at the screen, and the machine was then cranked *backwards* until the upper reel was full again—the frame order being reversed on the center track.

Finally, the aperture was moved over to the extreme right position and the show continued with the projector operating forward again. Some fun!

The extra projection lens on the front of this machine was to accommodate lantern slides. Dual lenses were common on early theatre projectors for the same purpose.

Even though intended for home use, the projector employed a carbon arc

FIG. 13. Edison's Kinetoscope, patented in 1897, used electric arc lamphouse from a magic lantern.

for illumination. This was the most desirable illuminant available on early projectors, but it was not the only one used. The limelight, mentioned last month, was popular in nickelodeons. The mercury arc also was used to a limited extent, but its blue-green color left much to be desired. Incandescent lamps were subject to filament damage rather easily and were not very bright.

They were not as dim as the kerosene lamp used in the toy projector shown in Fig. 17 however. This little machine was the very essence of frugality: it had neither a condenser lens, shutter, nor even a takeup reel, though it did boast a Maltese cross movement. With such inefficient illumination, its screen image could not have been much bigger than a postage stamp.

Sun as Light Source

Better models of oil lamp projectors featured multiple wicks in tandem. And the best had Welsbach mantles. But many home movie enthusiasts preferred *sunlight*, piped into the projector through a system of mirrors which followed the sun by means of a clock movement!

Another peculiar home movie machine which appeared early in the 20th century was the "Spiragraph," which used discs of film about 10 inches in diameter. These platters were mounted vertically on the front of the projector; another model employed a cylinder of film which completely surrounded the projector. The frames were printed on these films in the form of a spiral, and the lens dropped slowly as the picture progressed.

Synchronized sound made its bow early — about 1898 — through Thomas Edison's efforts. The sound was recorded on phonograph discs, which were driven off a shaft coupled to the projector. Mechanical recording being what it was, the actors' voices could not be picked up at a distance. So it was common practice for the principals in the cast to group themselves around a gramophone recorder before a "take" and shout their lines into the horn. Then, while the record was being played back, they would act out their parts before the camera, silently mouthing their lines in synchrony with the recording.

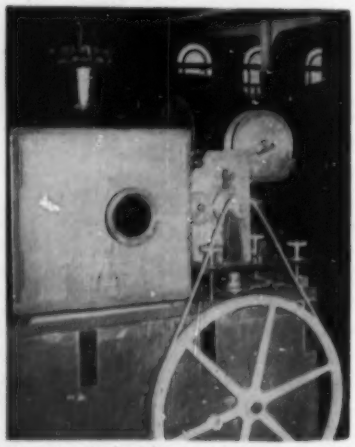

FIG. 15. Early Edison projector was among first to use now-standard Geneva movement.

The quality and volume of the sound reproduction were so poor, however, that mechanical records never received much favor. A more popular system, in some cities, involved supplementing the piano player or house orchestra with a sound effects man behind the screen. Some theatres even experimented with a small staff of actors who read dialog aloud behind the screen.

1912—First Optical Sound

The first optical sound tracks appeared in 1912. They were produced on the film by modulating a small carbon arc by means of sound waves, using a technique similar to the "singing flame" apparatus used by physicists of that day. This sound was played back electrically through three loudspeaking telephones behind the screen (the projector sound head consisted of a carbon arc and a selenium photocell). It was up to the projectionist to watch the screen and flip switches to direct the sound to the proper speaker, thus simulating stereophonic sound.

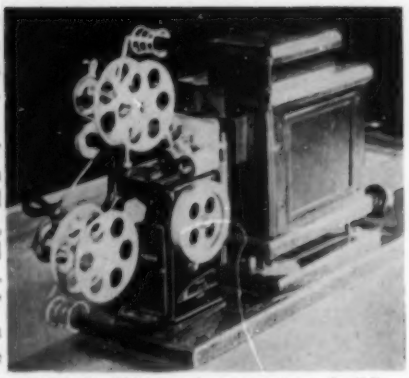

FIG. 16. This was home movies a la Edison in 1897! The film, with three rows of images, was 32-mm.

Color Came First by Hand

Color movies were also fairly common at this time. Hand-staining individual copies of a film had given way to hand-tinting a master matrix, frame by frame, with a transfer dye, which was then printed onto the individual copies for distribution.

It was still an enormously tedious process; a more popular system involved a technique similar to the field-sequential television process formerly

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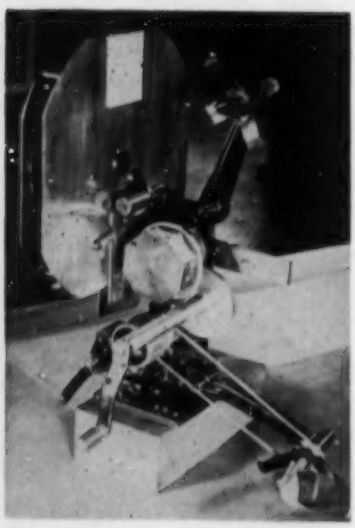


FIG. 14. Design principles used in Edison Biographot (1898) are being re-used today in Western Electric's Fastax speed camera.

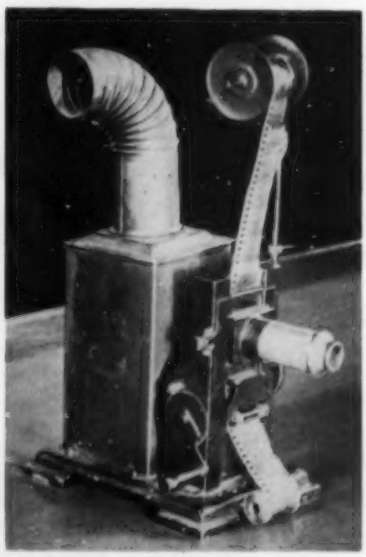


FIG. 17. A kerosene lamp was the illuminant in this tiny toy projector.

Magnetic vs. Optical Sound

To the Editor of IP:

In your August issue, you stated in reply to Harold Goldstein that projectionists and sound engineers can "*easily* get 10,000 cycles of undistorted signal from either the 1 or 1¼ mil scanning beams, which is 1000 to 2000 cycles higher than modern theatre speakers are designed to reproduce."

Take a look on page 32 of the same issue and you will notice that your "modern" speakers are no longer "top-notch high fidelity equipment." I believe Ampex is the second to announce hi-fi speakers for magnetic sound, Altec being the first. So you fellows better get new speakers along with penthouse reproducers.

Also, any secret you have for getting 10,000 cycles undistorted signal from an optical reproducer. I'll buy. Let's investigate the 1-mil. scanning beam with its higher frequency reproduction and higher noise levels:

Film passes this beam at the rate of 18 inches per second, which is equivalent to 18,000 1-mil lengths or sections per second. To reproduce one cycle the film must go from clear to opaque in a sine wave pattern. This takes 2 mils if the photo cell is to see and reproduce this pattern faithfully. So, 18,000-mil lengths per second divided by 2 mils per cycle gives 9,000 cycles for undistorted signal. I would also question the fidelity of this 9,000 cycle signal. So how about passing along the secret. I would like 10,000 cycle undistorted optical sound for my hi-fi speakers designed to reproduce the full range of magnetic sound.

ROBERT ZILLER

Billings, Montana

Frequency Range and "Quality" Repro

ANY optical soundhead—even an inexpensive early model which has been resurrected from the trash heap—very readily responds to 10,000 cycles per second when this frequency is recorded in the soundtrack and the optical tube is in reasonably good focus. Moreover, optical attenuation at 10,000 cycles is not excessive, the response at this frequency being 60% of maximum when the 1-mil scanning beam is used, and 40% with the preferred 1¼-mil beam.

There is no photocell lag at all when vacuum-type phototubes are used. These respond *instantly* even to millions of variations per second. The output of conventional gas-filled photocells, however, is approximately 70% of maximum at 10,000 cycles, resulting in a total response of 42% of maximum with 1-mil scanning, and 28% of maximum with 1¼-mil scanning.

Selectivity With Optical Track

Although this attenuation at 10,000 cycles can be compensated for in the amplifier circuits to provide a level system response, most engineers, as well as most listeners, prefer a "droop" at the high end of the response characteristic.

You may have the droop or not with optical-track reproduction (the choice is yours) but with the CinemaScope type of magnetic reproduction, such a choice does not exist. In CinemaScope magnetic sound the droop normally begins somewhere between 4000 and 5000 cycles and progressively creeps down toward the low-frequency end of the sound spectrum *as the magnetic heads wear and the soundtracks demagnetize themselves.*

Mr. Ziller appears to have doubts as to the highest frequencies reproducable optically. The high-frequency limit is found by dividing the rate of film-travel in inches (18) by the thickness of the scanning beam (0.001 for the 1-mil beam; 0.00125 for the 1¼-mil beam). Thus we know that 18,000 cycles is the cut-off frequency in 1-mil scanning, and 14,400 cycles in 1¼-mil scanning. Response is sufficiently strong to about 15,000 cycles in the first case; and to about 12,000 cycles in the second.

"Naturalness" Prime Factor

Especially to be noted is that design engineers of sound apparatus strive for factors *other than high cut-off frequencies* to attain perfect naturalness in sound reproduction. Uniform film speed, the absence of frequency and harmonic distortions, and the absence of intermodulation effects, for example, are far more important than attaining frequencies so high that hardly anyone *(if anyone)* can hear them.

To inject a personal note, the writer can hear nothing above 15,000 cycles, and he can hear 10,000 cycles only with difficulty as a faint whistling hiss. Perhaps the average listener can hear higher tones; but to nobody does any frequency higher than 9000 or 10,000 cycles provide appreciable "tone coloring" to sounds in either real life or motion pictures. "Hi-fi" is *not* synonymous with high frequency!

Frequency-Range Detection

The importance of extremely high-frequency response has been horribly oversold to the projection craft by the proponents of magnetic recording—the very people who really have the least to brag about in this direction.

Perhaps Mr. Ziller does not truly appreciate how little difference there is between 9- and 10,000 cycle sounds (not quite two semi-tones of the equitempered scale), or how extremely high in pitch these tones are. As an example, the highest tone on the Hammond electric organ, obtained by pulling out the last white drawbar (setting 00 0000 008) and pressing the last key at the right-hand end of the keyboard, is between 6- and 7000 cycles.

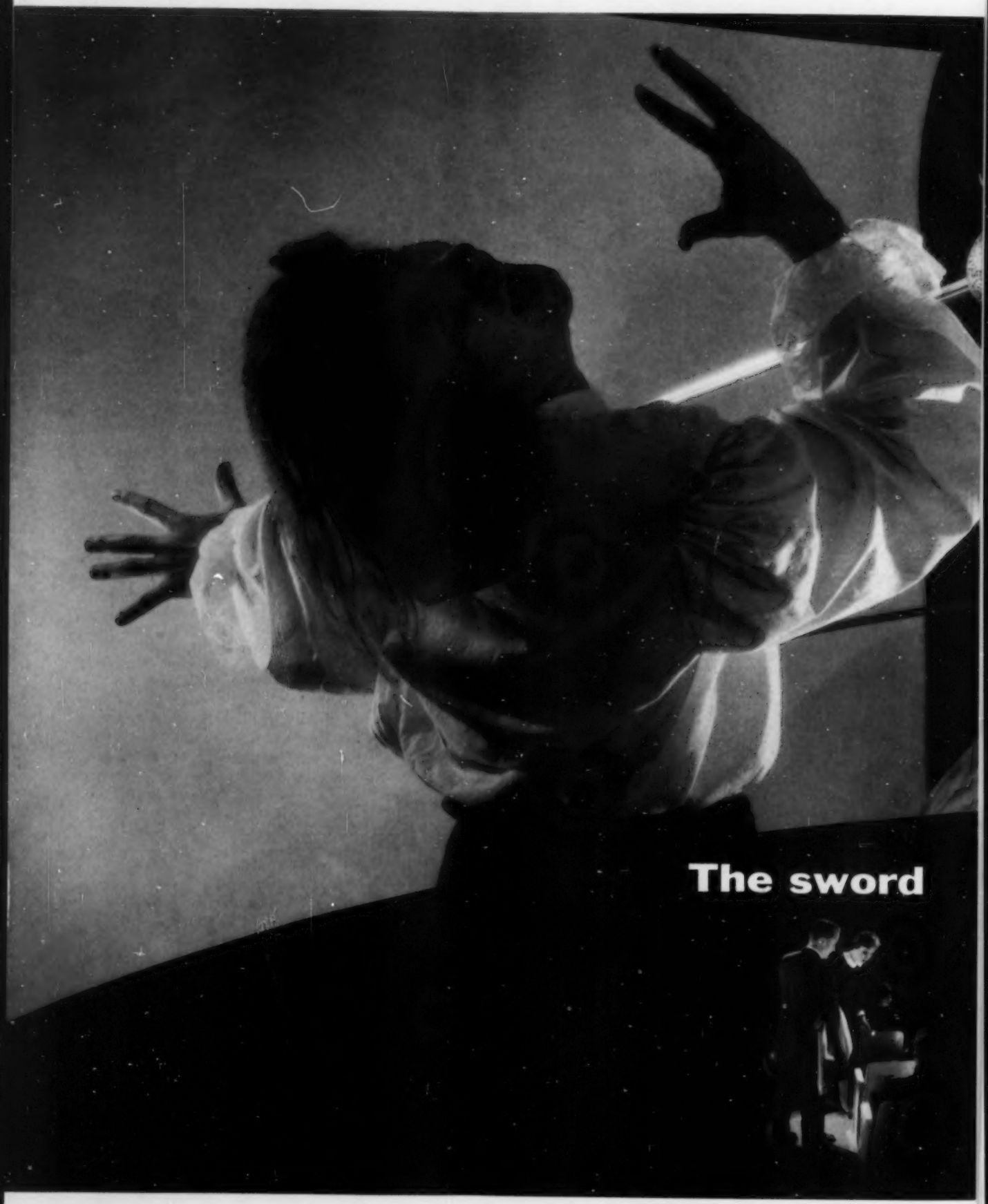
As another example, the highest note of the piccolo—the highest-pitched instrument of the flute family—has a fundamental frequency of 4752 cycles, with a faint "third harmonic" of 15,840 cycles *which is quite inaudible at this pitch.*

A sound reproducing system, therefore, need not go beyond 5000 cycles to produce faithfully the piccolo's highest note.

Why question the "fidelity" of a 9- or 10,000-cycle tone when the first overtone (second harmonic) of so high a fundamental is 18- or 20,000 cycles? What kind of sound system could possibly reproduce it, or, if reproduced, who could hear it?

Tones higher than 6- or 7000 cycles lose all timbre, or "tone quality." The nearest thing to an exception that we can think of is the peculiar tone

(Continued on page 26)


The sword

that pierces your heart . . . almost

Here make-believe gives tough battle to reality—virtually overcomes it for the duration of the show.

Size has much to do with this conquest. The wide, wide screen fills the eye from full left to full right—concentrates attention. At the same time, a sense of encircling nearness reaches out and engulfs the audience—makes it "one" with the action.

There are problems of production, processing, and projection with this new technic. They are present whether the film presented is black-and-white or color. Many of them have been solved by the motion picture industry with the help of the Eastman Technical Service for Motion Picture Film. Branches at strategic centers. Inquiries invited.

Address: Motion Picture Film Department

EASTMAN KODAK COMPANY, Rochester 4, N. Y.

East Coast Division
342 Madison Avenue
New York 17, N. Y.

West Coast Division
6706 Santa Monica Blvd.
Hollywood 38, California

Midwest Division
137 North Wabash Avenue
Chicago 2, Illinois

In The SPOTLIGHT

Morris J. Rotker, member New York Local 306

The function of this department is to provide a forum for the exchange of news and views relative to individual and group activities by members of the organized projectionist craft and its affiliates. Contributions relative to technical and social phases of craft activity are invited.

THE IATSE and ten major motion picture distributors have agreed on a two-year contract covering all employes in the "F" and "B" Exchange Locals in the United States. The new contract, which runs to November 30, 1956, calls for an increase of $5.50 per week per employe, retroactive to December 1, 1954, and for a reduction of the work week from 40 to 37½ hours, dating from January 3, 1955.

Decision to hold nation-wide talks was made following a poll in which the Locals of both back-room and front-office employes voted overwhelmingly against negotiating in each exchange area.

Representing the IA in the negotiations were Harland Holmden, General secretary-treasurer; Louise Wright, IA vice-president, and Joseph D. Basson, IA representative. President Richard F. Walsh participated in the final sessions. The distributors' committee consisted of representatives from Loew's, Inc.; 20th Century-Fox, Paramount, Universal, Warner Bros., National Screen Service, Republic Pictures, Columbia, United Artists, and RKO.

• Hugh W. Usher was recently re-elected to his third term as business representative of Local 303, Hamilton, Ont., Canada. Usher was first elected to this office when Hugh J. Sedgwick, former business representative, resigned to assume his new duties as IA representative in Canada.

• At a recent election, the following members were chosen to serve on the board of directors of the Local 150 Club, Inc., (Los Angeles): Albert R. Adams, Harold Angel, H. Clay Blanchett, Wallace G. Crowley, Ralph MacDonald, Paul J. Mahoney, Magnus Nielsen, Clyde W. Shuey, Hugh C. Smith, Leo F. Stockwell, Charles A. Vencill, *all incumbents*, and J. H. "Red" McDonald.

• Members of the Exchange Locals in Cleveland enjoyed their first Christmas and New Year holidays, in accordance with the recently concluded contract between the IA and the major distributing companies.

• Recalling the early days of motion picture entertainment seems to be a favorite pastime of many old-timers in the craft. In a reminiscent mood during a recent visit to the offices of IP, Morris J. Rotker, long-time projectionist and member of New York City Local 306, recalled those early days when motion pictures were considered freak attractions and were usually shown in vacant stores.

"The first movie theatre in which I was employed," said Rotker, "was a vacant store at 9 Bowery, New York City. Not only did I have to grind the projector but I also had to operate a "talking" machine which had a horn out on the street for the purpose of collecting a crowd in front of the store. At that time it was pretty tough to get the people to come in to see a movie, and all kinds of tricks were employed to get them inside the so-called playhouse.

"For instance, there were two empty windows in the Bowery store where I worked, in one of which a Chinese, dressed like a mandarin, would set up an easel and go through the motions of painting a landscape, or whatever caught his fancy. When a large crowd collected in front of the window the Chinese at a given signal, would take up his painting parapher-

MOVIE SOCIAL CLUB OF BROOKLYN (L. 306) HONORS MEMBERS

Jacob S. Winick, extreme left front row, and Harry Garfman, extreme right, are pictured here receiving gold life membership cards in the Movie Social Club of Brooklyn for their outstanding work in providing free entertainment for patients in various Brooklyn hospitals. Frank Grill, second from left, is shown presenting the award to Winick; Irving Meltzer, second from right, presents gold card to Garfman. Witnessing the presentations are, back row, left to right: Izzy Sillman, Harry Weinberg, and Irving Schlesinger.

nalia and disappear into the store. Then the barker—a smoothie—resplendent in a high hat and with a long, curly moustache, would step forward and go into his 'spiel' about the wonderful picture being shown inside—'for the fir-r-r-st t-i-m-e in this countre-ee'—and for only five cents!

"Once inside the store," continued Rotker, "the audience was shown a picture on a screen about the size of a tablecloth. The movies were silly, to say the least, but they were a novelty and attracted paying patrons. The longest pictures in those days were 800 feet and took about 3 to 4 minutes to run off. It was a steady grind getting the patrons to come in and then clearing the store for the next batch of customers.

"At that time I worked from 10 o'clock in the morning to 12 midnight, with no time off for lunch. I had to grind the machine with one arm while trying to eat my lunch with the other—all for the munificent sum of $12 per week."

• Joe Tritsch, member of Los Angeles Local 150 and very well known in projection circles on the West Coast, has been appointed sales engineer for Hal I. Huff Company, manufacturer of the Huff Hydro Carbon Coolers. Tritsch will be in charge of the company's expanded national sales force.

25 Years Ago — January, 1929

• Electrical Research Products, Inc., Radio Corporation of America, and other sound-installing companies agreed to a new road scale of $125 per week for sound supervisors and inspectors. This two-year agreement became effective January 1, 1929 . . . IA men replaced non-union projectionists in the showing of commercial or non-theatrical film produced by the Fox-Case Co. These films were generally shown in hotels or salesrooms . . . Projectionist Locals were notified by the IA General Office to make certain that all sound installations in their respective jurisdictions were supervised by a member of the Alliance under road contract. "Under no circumstance," read the notice, "should the so-called 'engineers', employed by the installing company, be permitted to train motion picture projectionists in the operation of such 'talking picture' device. This work properly comes under the jurisdiction of our International Alliance and none but members of the Alliance are to serve as supervisors or instructors." . . . Clyde Weston, secretary of the Ninth District, was appointed International representative . . . E. A. (Ed) Harrell, secretary of Local 226, Waco, Texas, was elected to the office of assistant reading clerk of the House of Representatives of the State of Texas . . . Locals were warned to be on the lookout for Joe Metz, who fraudulently claimed membership in Local 293, New Orleans; John Downs, who falsely represented himself to be a member of Baltimore Local 181; and for a party by the name of Lance traveling through Nebraska and falsely claiming membership in Local 185, Spokane, Wash.

After the Technological Furore--What?

A fine projection craftsman with a flair for lucid expression offers a few very well chosen words on the passing scene of motion picture exhibition.

By CHAUNCEY GREENE, IA Local 219, Minneapolis

YOUR "Monthly Chat" in the December last issue is one of the best of the many excellent ones IP has turned out. It is regrettable that the person quoted therein preferred to remain anonymous: his was a keenly incisive insight, and he summed it all up beautifully in so few words—"the showing of wares which even then, had we known it, were feasting upon their own vitals."

Comfortably lolling, fat, dumb and happy, within the originally large margin, the exhibitor has either ignored or sneered at technology for 40 years. His sneering ignorance has now caught up with him—but good! He is now right up against it, and it is going to cost him bushels of brains, millions of dollars and years of time to get himself out of it. There is some reason to doubt if he has enough of any of the aforementioned commodities to get himself out of the crisis into which he has "doped" himself.

Staff Teamwork a "Must"

We ourselves are not wholly blameless. The modern projection processes require a projection staff as completely correlated and rigidly drilled as a Navy gun-crew, a championship tennis team, or a pair of canoeists running "white water."

Actually, for optimum results the house manager has to be a member of this team. He has to contribute his share of the teamwork. He must realize that he cannot ring the house phone at any time and expect an immediate answer. He must not expect major revisions of film assembly on short notice or assign extra-curricular tasks "just to give 'em something to do." He must allow ample time for routine service, inspection, maintenance and repair.

Above all, he must realize that once he has a projection team honed to a fine edge, if he relaxes for his own expediency the all-important criterion of "the show comes first" it will naturally follow that the team will be tempted to relax it for urgently pressing personal matters on a "sauce for the goose—sauce for the gander" basis. Once this happens, the integration of the team is destroyed.

Superlative Results Obtainable

It is interesting—and a bit amusing—to compare the operational routine of the average "movie theatre" with that of Cinerama. The comparison is about like that of some rusty old tramp freighter in Panamanian registry with that aboard the Missouri, the Midway, or (God rest her soul) the Saratoga.

Incidentally, the Minneapolis Cinerama crew has hung up a record for sustained perfection unparalleled and unapproached in the entire Cinerama organization. They are now in their 37th week without one fluff—quite an achievement for so complex a presentation process.

Sure, technology will be a vital concern of the exhibitor—until, like the introductory period of sound reproduction, we put it upon an even keel. Then the wheel will turn again, and whether it again be war or peace will depend in large measure upon the degree of mutual respect exhibited on both sides.

Film Producer Praises VistaVision; Hits Hollywood Handling of 3-D

A YEAR-END discussion with a prominent New York producer of documentary and sales films for industry resulted in some interesting insights into recent technical developments in the motion picture business, and also brought forth violent condemnation of the way at least one of the so-called new processes was handled.

Asked what he thought to be the most valuable and permanent technical development of the year, he answered, "VistaVision. When the added cost of photographing a picture in the large-frame method is compared with the total cost of production, it is found to be very small indeed," he said. "In addition, there is the pleasant prospect that a VistaVision picture can be shown in any theatre on any 35-mm projector without any changes."

VistaVision's "Important Benefits"

Despite its simplicity, the VistaVision process provides important benefits, this producer stated. "The idea certainly isn't new, because producers of industrial films have long used the method of shooting with a 35-mm camera and reducing the print to 16-mm size in printing. Wherever a negative is much larger than the eventual print, a big improvement results, compared with a print made from a negative of the same size.

"The finer-grain print emulsion is able to retain most of the detail of the larger negative despite the reduction in size. Hollywood shouldn't have waited till the grainy images on the big, wide screens forced them to put this idea to work. It would have been a good idea at any time."

The quick-money coterie who ruined 3-D were the target of the producer's condemnation. He felt strongly on this point because he produced a documentary 3-D short for a Mid-West manufacturer of which he was very proud.

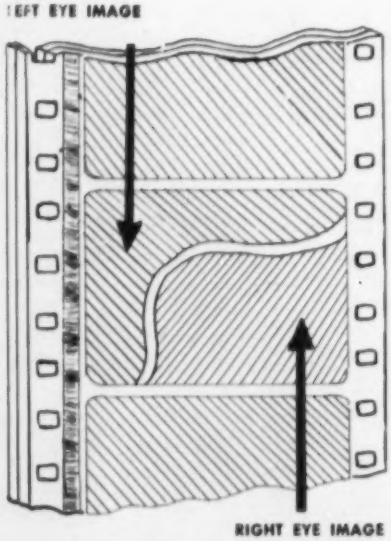
"3-D is certainly not worthwhile for every industrial film", he said, "any more than it is of value in every type of theatrical film. But it could have been of great value in the theatre with the right picture and right audience. Instead, it was overworked and forced on exhibitors and projectionists who hadn't had time to learn to handle 3-D problems. Even worse, the sloppy stereoscopic photography in most 3-D films made them eyesores to begin with.

Sensible 3-D Exploitation

"I had an idea about the proper method of presenting 3-D to the public. The methods used in presentation during the 3-D craze injured it to the point where the phrase '3-D' on the marquee started people running in the other direction instead of attracting them. I suggested a method of presentation that would have been based on a few quality showings instead of many bad ones.

"At the time that full-length 3-D films were first suggested as a means of ending public apathy toward movies, I advocated that 3-D be tried out in a limited number of theatres where equipment would be adequate and in perfect adjustment, and where higher admission prices could be charged to compensate for the extra cost involved.

"If a few good pictures were available, I believe that 3-D could have turned in an earnings record comparable to Cinerama, provided the problem were approached in the manner I suggested. Other theatres could have played the same picture flat with one print at standard prices. In this way, 3-D could have been built up as a long-range asset to the motion picture theatre.



Above is a simplified drawing illustrating the principle of the experimental Vectograph motion picture system. It would require only one projector because the two images of the stereo-pair are placed on the same film-frame — one in the front and one on the back of the film.

Is Revival Possible?

"3-D seems dead right now; but I believe it has a chance to become important again if public resistance created by slipshod productions can be overcome. The chance may come if the current effort by Technicolor and Polaroid to perfect the Vectograph system succeeds. Vectograph is a system that, roughly explained, puts both stereo images one on top of the other on the same film frame. Projection is through one projector. The film image itself is polarized so no porthole filters or beam splitters are required, and much of the light ordinarily lost in 3-D projection is saved. The only drawback is that the audience must wear polarizing spectacles.

"The failure of 3-D projection to catch on cannot be blamed on anyone in the exhibition field—certainly not the projectionist. The two-projector system could not work well without the finest equipment and intensive training for all technical personnel concerned, starting with the cameramen.

"All theatres were not in a position to show 3-D. It's a pity that those theatres for which equipment was obtained, and where projectionists had an opportunity to learn 3-D technique, cannot now occasionally show good 3-D pictures. It might be possible to revive interest that way."

Loew's of Canada Dividend

Marcus Loew's Theatres, Ltd., of Canada, has declared a regular quarterly dividend of $1 per share, plus an extra dividend of the same amount on its common stock. Net profit per share over the year is reported at $12.08 compared with $12.56 the previous year.

Perspecta Sound Overseas

About 1,500 exhibitors throughout the world have installed Perspecta stereophonic sound systems, according to Arthur M. Loew, president of Loew's International, who recently returned from a five-week tour of Europe. About 4,000 additional orders have been placed, he said.

1A ELECTIONS

LOCAL 106, MARION, IND.

Milton Huffaker, *pres.*; Harrison Rainey, *vice-pres.*; Glenn Weaver, *fin.-sec.*, and *bus. rep.*; Arlington Hankins, *cor.-sec.*; Gene Miller, *sgt.-at-arms.*

LOCAL 150, LOS ANGELES, CALIF

Wallace G. Crowley, *pres.*; J. H. "Red" McDonald, *vice-pres.*; Charles A. Vencill, *sec.-treas.*; Clyde W. Shuey, *bus. rep.*; Clinton C. Bolinger, Virgil Crowell, John Sickinger, *exam. board*; Charles Bramel, Tom Ginthner, Ralph MacDonald, *trustees*; Albert R. Adams, Harold Angel, H. Clay Blanchett, Clem Marchand, George O'Brien, *exec. board.*

LOCAL 181, BALTIMORE, MD.

Louis P. Sieber, *pres.*; Charles J. Grauling, *1st vice-pres.*; Charles I. Dotson, *2nd vice-pres.*; Wm. C. MacKinzie, *3rd vice-pres.*; Calvert Silverblatt, *rec.-sec.*; Thomas P. Finn, Sr., *fin.-sec.*; Maurice Rushworth, *bus. rep.*; Ralph W. Rushworth (chairman), J. Harry Gentile, Sr., Thomas W. Dolan, *trustees*; Charles Gerber, Thurman L. Durst, *wage scale comm.*; Elmer Kastner, *sgt.-at-arms*; L. P. Sieber, Samuel Isaacson, and T. P. Finn, Sr., *del. Baltimore Federation of Labor.*

LOCAL 257, OTTAWA, ONT., CANADA

J. McGuire, *pres.*; J. Macauley, *vice-pres.*; W. Murray Hall, *sec-treas.*; W. H. Hartnett, *bus. rep.*; E. Field, W. H. Maxwell, D. M. Ritchie, *trustees*; S. Ventura, *sgt.-at-arms.*

LOCAL 253, ROCHESTER, N. Y.

Louis Levin, *pres.*; Joseph Pandina, *vice-pres.*; Lester D. Barager, *sec.*; Leon E. Burton, *treas.*; Fred E. Boekhout, *bus. rep.*; Louis B. Goler, *trustee*; Fred Hart, Frank Placerean, Charles Tibbetts, L. B. Goler, *exec. board*; John Copple, *sgt.-at-arms*; Charles Mason, Jr., C. Tibbetts, F. Hart, *trustees, retirement fund*; Joseph Vecchio, Sr., and Fred J. Closser, *del. Central Trades.*

LOCAL 303, HAMILTON, ONT., CANADA

H. H. Thornberry, *pres.*; S. James, *vice-pres.*; J. P. Owens, *treas.*; Hugh W. Usher, *bus. rep.*; J. A. Loughlin, H. J. Sedgwick, H. Konkle, *exec. board.*

LOCAL 343, OMAHA, NEBR.

Ora Farnsworth, *pres.*; V. Beck, *1st vice-pres.*; C. Jones, *2nd vice-pres.*; Ross Hatton, *treas.*; Clyde Cooley, *sec.*; J. I. Kelly, *fin.-sec.*; H. Jackson, *bus. rep.*; R. L. McIntyre, Clyde Blubaugh, Art Krake, *trustees*; Al Frazier, *sgt.-at-arms.*

Reduced Prices for Oldsters

The manager of the University Theatre, Cambridge, Mass., has arranged with local civic groups to admit "senior citizens" (those over 65) at a 25-cent reduction in price. In order to be eligible the oldsters must obtain identity cards from the civic groups.

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More Electronic Marvels on the March

A general idea of what we may expect in the way of practical new developments in the electronics and atomic energy field during the next decade was given by David Sarnoff, board chairman of RCA, in a recent speech in St. Louis. Describing the work of the RCA experimental laboratories in Princeton, N. J., he stated:

"The climactic chapter in the story begins as recently as 1951. On the occasion of my 45th anniversary in radio, I suggested to our research men that they invent three presents by the time my 50th anniversary arrives.

"I asked them, first, for a magnetic tape recorder for Tv programs; second, for an electronic air-conditioner; and third, for a true amplifier of light. And, amazingly, there is reason to believe that I shall receive all three of these presents within the time specified.

Magnetic Recording Progress

"The magnetic Tv tape recorder has already been produced and it functions in color as well as in black-and-white. It records and reproduces sight as readily as magnetic tape does for sound. Its implications for the future are many. To cite just one example, the Tv camera can be used to make telemovies at home. You can make a tape recording of Willie eating his porridge, and in color, just as heretofore you could record his first prattlings—and you can project it on your own Tv set.

"As for the electronic air conditioner, encouraging progess is being made and a laboratory model is now under way.

"But what interests us most directly is the evidence that the light amplifier is not too far out of reach. I am speaking of light which is produced directly within a thin layer of electronically active material. Already, I have seen this light amplification experimentally, in ratios of more than 20; and further progress is certain to be made.

"A first benefit from this research will be bigger and brighter Tv pictures in the home. I belive that the Tv tube of today will eventually be eliminated. It will be displaced by a thin, flat screen like a picture on the wall. Or, it may be in an easel-like frame that will sit on your living room table and, being portable, can be moved to any other part of the room or house. If desired, the same program could be received on a number of screens in different rooms of the house.

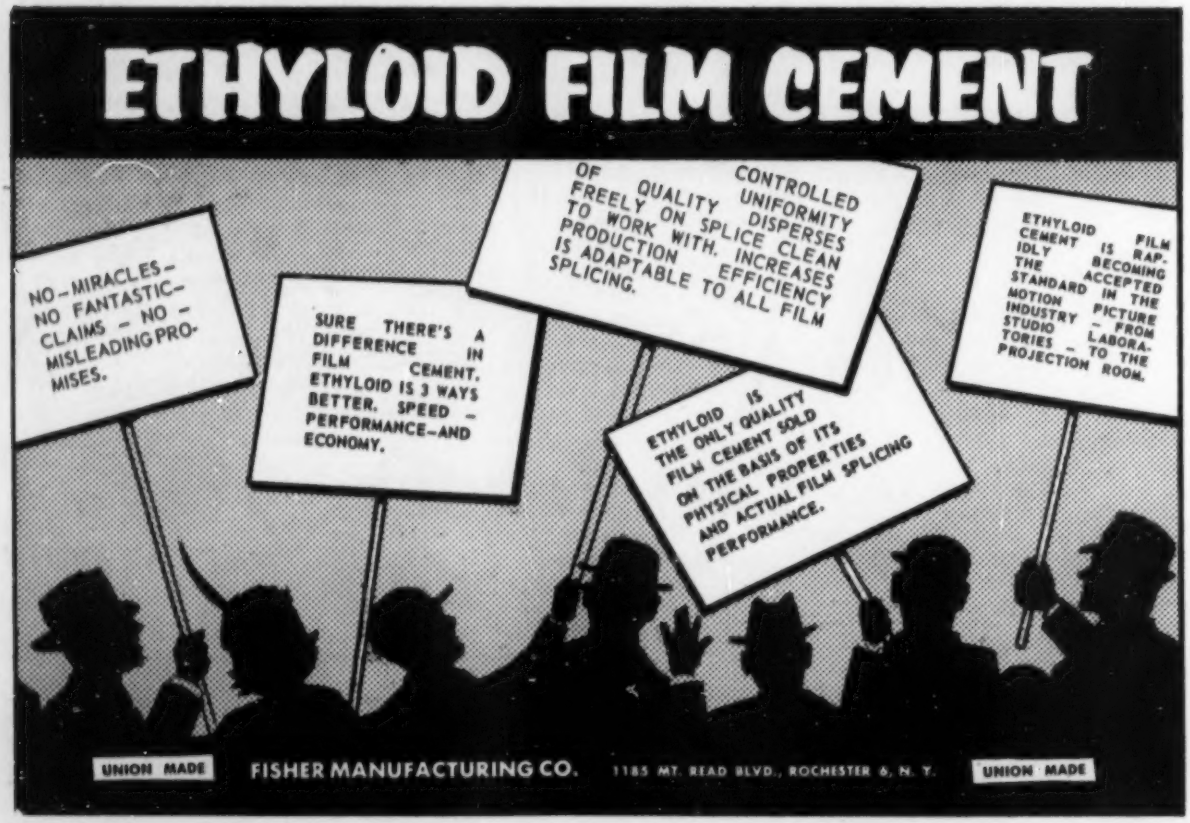
"The picture could be controlled from a little Tv box no bigger than a jewel case or cigar box. No cabinet will be required. The box will contain all the controls—tuning, volume, light, station selector—and a knob will enable you to make the image larger or smaller, and in black-and-white or in color, to suit your eye and your mood.

"Television, however, is only one of the avenues through which electronic light will flow into daily life. Right down the line it will provide substitutes for present types of light used for illumination.

Cigar-Box Tv Set

"In other areas, the electronic light amplifier may be expected to lead to devices which will make vision possible in darkness. These will add greatly to the safety of our transportation on land, at sea and in the air. The perils of night driving, too, are likely to be reduced and perhaps abolished by such electronic devices providing far-reaching light without glare.

"So much for Light, the first of the three topics in my assignment for this address. The second is Power. We require no crystal ball to foresee that in the near future power will mean nuclear energy. That ships, locomotives, aircraft and even automobiles will in due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time be propelled by atomic fuels can be taken for granted.

"Recently, as we saw on Tv and heard on radio, President Eisenhower waved a neutronic wand over an electronic device in Denver, Colorado that set into motion a power shovel at Shippingport, Pennsylvania. The shovel in turn broke ground for the first commercial plant to be powered by atomic energy. The era of nuclear power for civilian use was touched off at that moment.

Atomic Power Plants

"Today, 73% of electric power in the U. S. is derived from steam power plants fired by coal, oil or gas, and nearly all the rest from water power. In the years ahead, electricity will be increasingly derived from atomic energy. How much of it and how soon, no one can as yet estimate with certainty.

"Last January, RCA staged a public demonstration of an electric battery powered by atomic energy. The amount of current produced was minute: barely enough to send a telegraphic message. But the implications of that moment were far-reaching. This was no longer a matter of using nuclear energy as a fuel to produce steam to generate electric current. It was the direct conversion of atomic energy into electric power. The principle has been successfully established—and that is always the break-through point in the emergence of new forces.

"When atomic batteries become available they will bring into the realm of practicality a long array of miniature devices, such as wrist-watch radios, or vest-pocket radio telephones, or electric shavers no bigger than a penknife.

The Revolutionary Transistor

"Today, the transistor is a marvelous midget already in practical use. It was born of the exploration of the electronic properties of solids. No larger than a kernal of corn, the transistor can detect, amplify and oscillate, which is to say that it can perform the fundamental functions of the familiar electron tube.

"We at RCA have built a Tv set equipped with transistors. It uses no tubes except the picture tube. We can now look ahead confidently to the day when Tv receivers will use transistors and the picture tube will make way for the new picture screen already described.

"The fact that electronics and atomics are unfolding simultaneously is a portent of incalculable changes ahead. Never before have two such mighty forces been unleashed at the same time. Together, electronics and atomics are fated to dwarf even the industrial revolutions brought by steam and electricity."

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LETTERS TO EDITOR

(Continued from page 17)

quality obtained with a sub-third harmonic, as in certain organ registrations. (The *vox humana* stops on a pipe organ has this strange tone.)

Print Condition Vital

Now, magnetic-track reproduction of the CinemaScope variety approaches the wide-frequency range of standard optical sound *only* when the print is fresh and the pickup heads are in brand-new condition. Self-demagnetization of magnetic recordings *of this type* result in a very rapid roll-off of frequencies above 4000 cycles. Only with great difficulty is 9000 cycles obtained without serious attenuation in the reproduction of CinemaScope magnetic tracks, and a value between 7- and 8000 cycles represents the practical limit with *used* prints under *average* theatre conditions.

Special types of magnetic recording easily go up into the supersonic range; but the currently prevalent "yakkety-yak" about the "high-frequency response of magnetic tracks" is the bunk, pure and simple. Optical sound did better in 1929, so far as high-frequency soundhead output is concerned, than CinemaScope magnetic sound can do in 1955. But, as we said, truly-natural, high-fidelity sound involves factors of much greater importance than raising the top-cut a note or two on the musical scale.

"Harmonic Content" Controls

The highest frequency of the audio signal that comes out of the soundhead (optical or magnetic) and the highest frequency that emerges from the system speakers are two different things. Loudspeakers are mechanical devices; and they have been an obstacle to hi-fi reproduction in three ways:

(1) They reproduce certain frequencies louder than certain other frequencies.

(2) Their range of response is limited; and

(3) They add to the sound false harmonics not present in the signal.

Verily, the *very latest* speaker assemblies capable of giving a reasonably even response from 40 to 12,000 cycles represent a significant advance in sound engineering. The average modern speaker assembly of good manufacture does well indeed to give a smooth response up to 8000 cycles. But this is a sufficiently wide range of frequencies for satisfactory sound reproduction.

We have no quarrel with the quality of CinemaScope magnetic sound reproduction when film and equipment are in good condition: the sound is "pure" and reasonably high-fidelity despite its limited frequency range and attenuation of the higher audible frequencies. But this type of magnetic sound can also be very bad, and it seldom reaches the degree of perfection attainable by the *best* optical sound. For re-recording purposes wide-track magnetic sound is probably superior even to the finest disc recording; but for general use in the theatres the CinemaScope type of magnetic sound is expensive and generally troublesome.

Optical System Line-Up

There is also no need to quibble over the difference between 9000 and 10,000 cycles as the top frequency of a sound system. By listening to a

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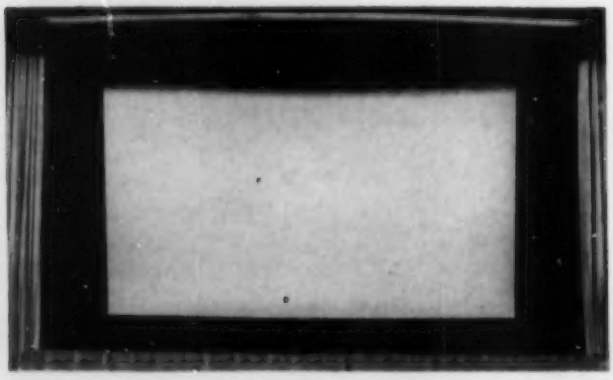

- The 55 foot Williams All-Purpose Silver Screen (left) installed in the Palace Theater, Akron over a year ago, still supplies sharp definition in every projection method.
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single tone of either of these two frequencies, neither Mr. Ziller nor myself could tell which frequency it was; but if Mr. Ziller insists upon 10,000 cycles of optical sound for his hi-fi speakers, all he has to do is put his optical tubes in focus. A 10,000-cycle test film and an output meter will remove his doubts.

Let's keep in mind the fact that the highest frequency response of the best commercial hi-fi speaker units (*circa* 12,000 cycles) is not even one octave above the highest response of the older single-horn units (*ca.* 8000 cycles). The difference between these two high frequencies actually amounts to the pitch-difference represented by two keys on a paino keyboard five white keys apart.

And let's be on our guard against being duped by the popular fetish of extremely high audio frequencies. Mr. Ziller's speakers are hi-fi, not because they respond to 10,000 or 12,000 cycles instead of 8000 cycles as the top frequency, but because their response over their *entire* frequency range is smooth and clean and free from the generation of spurious harmonics.

IA OBITUARIES

WALTER BEMIS, 76, member of Local 384, Hudson County, N. J., died December 20. Born in Jamaica, Vermont, in 1878, Bemis, at the tender age of 14, wound up in New York City where he got a job as assistant property boy with Huber's Museum and Theatre, located on 14th Street. Part of his duties consisted of running slides and when the Museum got its first movie projector, a Jenkins, Bemis projected such early pictures as *The Great Train Robbery, Black Diamond Express, The Life of a Fireman,* and other movies of that vintage.

Walter Bemis joined Auxiliary Local 35 back in 1909 which was later absorbed into New York Local 306, transferring to Local 384 in 1915, where he held membership until his death. He also was a member of the 25-30 Club of New York.

An ardent unionist and expert craftsman, Bemis prided himself on his sense of fair play, and he truly lived up to the old adage "an honest day's work for a fair day's pay."

Survivors are his wife and a daughter.

NORMAN JOSEPH LARSEN, 63, member of Local 91, Boise, Idaho, died December 31st at the Veterans Hospital from a heart attack. Born in Bellevue, Idaho on October 21, 1891, Norman Larsen moved to Boise in 1903 and in 1916 he joined Local 91, of which he was a member in continuous good standing during his lifetime. He was a veteran of World War I, and a member of the American Legion.

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TOY TO GREAT INDUSTRY

(Continued from page 16)

advocated by CBS: a tri-color disc was rotated in front of the camera so that successive frames were exposed through red, yellow and blue filters. The projector shutter carried an identical set of color panels and these reconstituted the colors on the screen. The process used a film speed of 48 frames per second to achieve a complete color cycle each second. Even so, a rapidly moving object sometimes disintegrated into a path of multiple red, yellow and blue objects.

By the time World War I broke out, the motion picture industry had become firmly established. Movies had transcended the stage of being a mere mechanical curiosity and were becoming accepted as a new art form.

A young pioneer, D. W. Griffith, devised the star system, filmed spectacles and produced the first epic dramas, *Birth of a Nation* and *Intolerance*. An adventurer, Robert Flaherty, made the first documentary movie, *Nanook of the North*, still acclaimed as one of the finest films ever produced.

On the horizon were electronic sound, Technicolor, 3-D, Cinerama, CinemaScope and television — doubtless the "livingest" picture of them all. And there is no reason to believe that we have seen the end of the line, so long as men with imagination continue to play with this toy.

FILM DAMAGE INCREASE

(Continued from page 14)

Super Simplex or E-7 mechanism. The optical-sound film will rub against the hole in the top of the soundhead unless an extra guide roller is installed. The part number of this guide roller is G-2389. An alternative is to employ the special Simplex fire valve unit which is so constructed that it extends *into* the Simplex X-L magnetic soundhead.

This trouble happens to be quite common, the installation engineers failing to supply the extra guide rollers needed or reconverting the magazine fire valve assemblies. Only the base side of optical-track prints gets scratched, it is true; but even these scratches quickly fill up with oily dirt and show up as "rain" on the screen. Projectionists who have endured this bad condition for a period of months inform us that the supply company which installed the CinemaScope gear turns a deaf ear to all requests for a correction of the film path. In one theatre, it pains us to say, the chief projectionist apparently doesn't give a damn whether the film gets scratched or not; but this astonishing nonchalance is the exception rather than the rule.

Narrow-Teeth Sprockets

The narrow sprocket teeth used in projectors and soundheads fitted for magnetic stereophonic CinemaScope wear out *all* prints faster than ever before. It has been stated that the lower rate of shrinkage of modern safety film permits narrow-toothed sprockets to be used without decreasing the life of the prints. This idea is absurd: film shrinkage does not enter into the picture at all.

All modern sprockets are slightly larger than old-time sprockets, and hence fit the perforations of the film more exactly. Sprocket diameter being the same, film has a much longer life when transported by the regular wide sprocket teeth, all laboratory tests notwithstanding.

When sanity finally pervades the technological arena, the quality and condition of release prints will undoubtedly improve. Rain will then come from the clouds instead of from projection rooms.

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1954: DECISIVE YEAR

(Continued from page 12)

possible volume of light to wide screens. Perhaps the most notable development in this regard was the Kollmorgen *f*/1.7 lens described in the October issue of IP. Other manufacturers, such as Bausch & Lomb, Projection Optics, Wollensak and Vidoscope, also announced faster lenses.

Also made available by a number of manufacturers during 1954 were prismatic variable anamorphic lens units capable of "unsqueezing" not only the CinemaScope prints but the 2-to-1 ratio anamorphic prints announced by Paramount. In addition, Bausch & Lomb, the largest manufacturer of fixed cylindrical anamorphic lenses for CinemaScope, announced early in the year that it was producing a complete new line of anamorphic camera lenses that greatly improved the sharpness of CinemaScope prints.

After being obscured for some time in the shadow of the big screen, theatre Tv experienced a revival of interest in 1954. Not only sporting events, but also other entertainment such as the opening-night program at the New York Metropolitan Opera House, reached audiences in theatres throughout the country.

Theatre Tv Revives

Theatre Network Television, a firm producing Theatre Tv shows, had considerable success with closed-circuit Tv hookups to both hotel ballrooms and theatres for linking conventions and sales meetings held simultaneously in different areas. Portable Theatre Tv projection equipment was used in the ballrooms. Nathan Halpern, president of TNT, described his company's work in Part 2 of the July issue of IP.

Although no demonstrations oc-

(Continued on next page)

Stereosound Problems Solved

Use of stereophonic sound has resulted in a number of problems for recording technicians at motion picture studios, but most have been overcome, says Leon Birnbaum, music editor of 20th Century-Fox. Formerly, only a few sound tracks were employed in making a picture, but stereosound calls for as many as 20 separate tracks because all types of sound cannot be recorded simultaneously. Combining 20 tracks for the three magnetic tracks of the release print requires great skill.

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curred in 1954, 20th Century-Fox engineers have been working to eliminate the last bugs in the Swiss Eidophor system of Theatre Tv, which was first described in detail in IP some years ago. This system is able to use a powerful arclamp as a light source and is therefore capable of filling a very large screen with a bright picture, a feat that is somewhat beyond the capacity of the light-gathering system in the Tv projectors now being used.

Along with projector and lens manufacturers, producers of arclamps and rectifiers were also working to better adapt their products to changes in film presentations. Obtaining a sharp, pleasing picture of large size also requires more powerful light sources. Among the companies in the forefront of these efforts were J. E. McAuley Mfg., Strong Electric, RCA, Hertner Electric, and J. E. Robin.

In addition, the National Carbon Co. is now developing carbons which will make even greater light gains possible wherever necessary in large indoor houses and drive-ins. Screen manufacturers, such as Radiant, Raytone and Bodde have been working to provide screen surfaces highly efficient in light reflectance.

Perhaps the most radical development of the year was the demonstration by RCA of an experimental method of recording not only sound but black-and-white and color motion pictures on magnetic tape. At the demonstration a color picture, originating from tape rather than film, was reproduced on a television screen. However, any application of this idea to the motion picture theatre, except possibly in connection with theatre Tv, is still far in the future.

All in all, 1954 stacks up as the year when the motion picture industry's battle to adapt itself to the age of television began to pay off. All problems, particularly those of the small exhibitor, have certainly not been solved, but the tide is turning and the future looks bright provided both the production and exhibition sections of the industry continue to fight as vigorously as they did during 1954.

LIGHT SOURCES FOR FILM PROJECTION

(Continued from page 10)

light that can be collected by the condensing lens or reflector and sent to the screen.

Much of the light production of the low-intensity arc we have been considering can be transferred from the positive crater to the arc-stream by using special cored carbons called "flame" carbons. Either the positive alone or both the negative and positive carbons of a flaming arc may have this special core which contains, in addition to powdered carbon, such flaming materials as calcium, cerium, and thorium compounds which pass into the arc-stream and luminesce there to produce a brilliant flame.

A Tremendous Advance

All of the useful light of the ordinary low-intensity arc comes from the white-hot carbon of the positive crater, so the introduction of flame carbons was admittedly a tremendous innovation in arc-light technology. The flaming arc is important to us projectionists because it led directly to a new and superior type of arc known as the "high-intensity" arc. The flaming arc is also interesting be-

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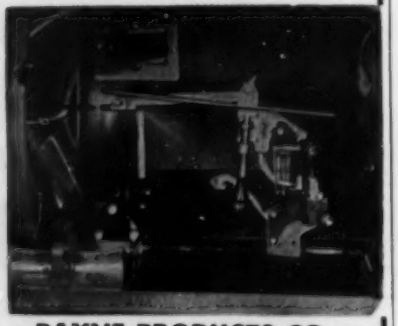

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cause it can be operated on A.C. with fairly good results.

The most efficient carbon arc is the D.C. type. If an arc employing a regular D.C. trim is operated on A.C., *both* electrodes alternately become positive and negative—60 times a second if the current be 60-cycle.

A crater is formed in the end of the positive carbon in D.C. arcs because the positive gets much hotter than the negative and boils away more carbon than does the negative. Some of this vaporized carbon passes over to the tip of the negative by electrolytic action and condenses there, helping to build up the tip of the negative as a pencil-shaped cone. A good crater obviously cannot be formed in either carbon in A.C. arcs. In addition, the alternations of the current cool the arc-stream and the carbons and such an arc hums noisily and flickers.

The Beck Accomplishment

Flame carbons, by transferring light production to the otherwise only faintly luminous arc-stream, work quite well on A.C. The rare-earth atoms in the arc-stream hold the heat while the voltage drops to zero (120 times a second in the case of 60-cycle current), and the lack of good crater formation is unimportant in this type of arc. In the days of low-intensity arcs, projectionists kept a box or two of flame carbons on hand to use on A.C. in the possible event of generator or rectifier failure.

In 1913, in Germany, a scientist by the name of Beck began to experiment with flame carbons, modifying their structure and composition, and utilizing the natural magnetic field of the arc-stream to *force* the white flame to assume the form of a compact ball of gas in the crater of the positive carbon. When condensed in this manner, the radiant flame becomes even more brilliant than the white-hot carbon of the positive crater; and the arc in which this "Beck effect" is accomplished became known as the *high-intensity* carbon arc.

Larger Core Used

The core of a white-flame positive carbon is somewhat larger than the arc-stabilizing core of a regular low-intensity positive carbon. Beck made his positive core even larger and filled it with a higher percentage of rare-earth salts—compounds of cerium, lanthanum, and 13 other elements in addition to thorium, scandium, and yttrium. This change in the composition of the positive carbon necessitated a change in the volt-ampere relationship of the electric current fed to the arc.

It is well known that flaming trims worked best at their maximum current rating. Beck, or high-intensity, trims required even lower amperages, but lower voltages. Rectifiers and generators designed for low-intensity operation, therefore, usually have to be replaced when high-intensity arc-lamps are intalled. Fortunately, H. I. arcs require less ballast-drop than do L-I arcs, hence are not so wasteful of current.

[TO BE CONTINUED]

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INTERNATIONAL PROJECTIONIST

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Electronic Research Project

Electrecks, the name given to permanently polarized dielectrics, the electrical counterparts of the permament magnet —are now nothing more than laboratory curiosities without commercial utilization. Proposed research might turn up applications in electrometers, microphones, electron tubes, and electrostatic filters for removing dust. Electrets as now known can be used as the source of an electrostatic field, but not as a source of electric current.

New Kodak International Division

Eastman Kodak Co. has formed an international division to combine the former functions carried out by the company's Rochester export sales department and the European & overseas organization. The new division is located in the company's administrative headquarters at Rochester, N. Y.

Motiograph Aperture Adapter

An adapting unit which makes possible instantaneous changes of aperture plates on older Motiograph projectors is now available. Motiograph projectors Models H, HU, HK and K, sold from 1926 through 1941, did not have a readily removable aperture.

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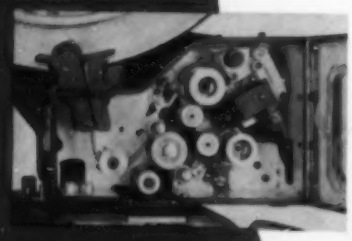

INTERIOR VIEW shows the tight loop system of the SL Soundhead. This system, tested and approved, has been used for years by the major studios in original "rushes".

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